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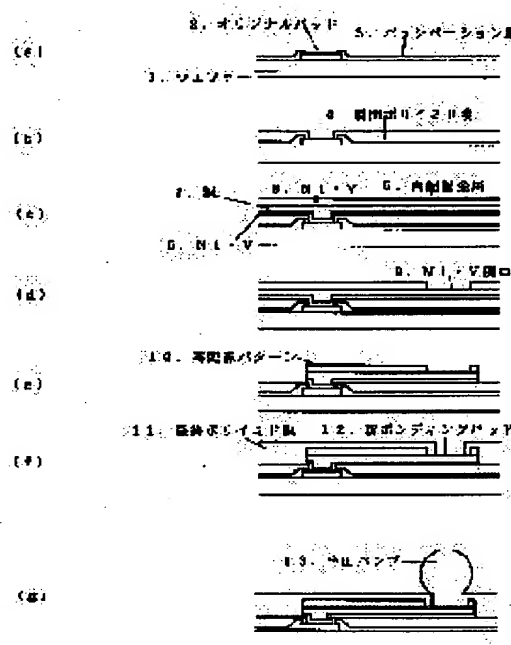
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(54) STRUCTURE OF SEMICONDUCTOR WIRING

(57)Abstract:

PROBLEM TO BE SOLVED: To easily secure the tight adhesion between semiconductor wiring and a projecting electrode, by constituting a rewiring structure in which an original pad on a semiconductor chip is rewired on a new bonding pad at a different position in a three-layer structure and the metallic structure under the projecting electrode is constituted in a two-layer structure.

SOLUTION: In a rewiring metal depositing process, rewiring metals 5 are deposited in three steps in the order of Ni.V 6, Cu 7, and Ni.V 8 by the sputtering method. Then, in an Ni.V opening process, the uppermost Ni.V 8 of the metals 5 is etched and the Cu 7 is exposed in an Ni.V opening 9. Successively, in a rewiring forming process, a rewiring pattern 10 is formed by etching the Ni.V 8, Cu 7, and Ni.V 6 of the metals 5 and a new bonding pad 12 is formed by using the final polyimide film 11, so that the rewiring pattern 10 may be protected and the Ni.V opening 9 may be exposed. A solder bump 13 which is formed as a projecting electrode is formed on the new bonding pad 12.



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3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] the new bonding pad from which a position is different in the original pad on a semiconductor chip -- rewiring -- carrying out -- the protective coat of this rewiring -- a polyimide system resin -- using -- the above -- being [in the structure of attaching a salient electrode to new bonding putt, the number of rewiring structures is three, and / the metal structure under the aforementioned salient electrode / two-layer] **** -- the structure of the semiconductor wiring characterized by things

[Claim 2] The metal of the lowest layer of the aforementioned rewiring is the structure of the semiconductor wiring according to claim 1 characterized by the aforementioned original pad material and the adhesion force being good, and the aforementioned salient electrode material and wettability being good.

[Claim 3] The metal of the lowest layer of the aforementioned rewiring is the structure of the semiconductor wiring according to claim 2 characterized by being a metal containing nickel or nickel.

[Claim 4] The metal of the interlayer of the aforementioned rewiring is the structure of semiconductor wiring given in three from the claim 1 characterized by the metal and adhesion force of the lowest layer of the

aforementioned rewiring being good, and the aforementioned salient electrode material and wettability being good.

[Claim 5] The metal of the interlayer of the aforementioned rewiring is the structure of the semiconductor wiring according to claim 4 characterized by being copper.

[Claim 6] The metal of the best layer of the aforementioned rewiring is the structure of semiconductor wiring given in five from the claim 1 characterized by the aforementioned rewiring's metal and adhesion force of an interlayer being good, and the aforementioned polyimide system resin and the adhesion force being good.

[Claim 7] The metal of the best layer of the aforementioned rewiring is the structure of the semiconductor wiring according to claim 6 characterized by being any one of the metals containing titanium, a titanium nitride, chromium, nickel, or nickel.

[Claim 8] The aforementioned salient electrode is the structure of semiconductor wiring given in seven from the claim 1 characterized by being solder.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the rewiring structure which carries out rewiring of the bonding putt for wire bonding to the pad for flip chips in more detail with respect to the rewiring structure of a semiconductor chip.

[0002]

[Description of the Prior Art] In recent years, the flip chip bonding which mounts a bare chip on a substrate by direct face down in connection with the miniaturization of a semiconductor package and densification is developed. the appearance of a camcorder/movie, a portable telephone, etc. -- a bare chip and abbreviation -- the compact package of the

same size and the pocket device which carried the so-called CSP (a chip size / scale package) are appearing successively. Development of CSP progresses quickly and the commercial-scene demand has got into stride recently. However, since the bonding pitch is large compared with a wire-bonding pitch, a flip-chip-bonding pitch cannot use IC for wire bonding for a flip chip as it is. Therefore, it moves to the pad for flip chips, and must enable it to use for flip chip mounting by carrying out rewiring of the pad for wire bonding which is around a semiconductor chip into the element area of a semiconductor chip first.

[0003] The conceptual diagram of rewiring is shown in drawing 3. The original pad 2 is arranged at the periphery of the IC chip 14. The new bonding pad 12 is moved for this original pad with the rewiring pattern 10. A pad pitch becomes large by this and the solder bump 13 can be formed now.

[0004] The conventional A-A' cross section of drawing 3 of the structure which carried out rewiring is shown in drawing 4. The polyimide film 4 between layers is used for a layer insulation film, and while raising the adhesion force of Ti16, the copper 7 for making wiring resistance low, and a polyimide film to barrier metal with an original pad as a metal of the rewiring pattern 10, nickel-V (alloy of nickel vanadium)6 for improving wettability with the solder bump 13 is used. As the last insulator layer, the last polyimide film 11 is used and the solder bump 13 who is a salient electrode is formed in the new bonding pad 12.

[0005] However, there are the following problems in the rewiring structure shown in drawing 4. In order to make a resultant between a polyimide and nickel-V6 and to make an oxide film on nickel-V6 front face further at the time of the cure of a PORIMIDO film at the time of formation of the last polyimide film 11, at the time of solder bump 13 formation, wetting of solder and nickel-V is insufficient and the

problem that adhesion intensity becomes low occurs. In heat reliability, solder and copper react, it reaches to Ti front face, the interface of Ti and solder is made, and poor adhesion occurs at the same time copper starts migration within a polyimide and reliability falls with the structure of drawing 4, when nickel-V is lost.

[0006] The cross section of other conventional rewiring structures for solving the problem of drawing 4 is shown in drawing 5. The difference from drawing 4 is the point of having formed the copper pad 15 in the new bonding pad 12 on nickel-V6. Since the copper pad 15 etched a front face easily before forming the solder bump 13, it has solved the problem in the structure shown in drawing 4.

[0007] The conventional rewiring process for manufacturing the structure in which drawing 5 carried out rewiring to drawing 6 is shown. The wafer manufacturing process shown in drawing 6 (a) forms an element on a wafer 1 (not shown), forms the original pad 2 in each IC chip, and protects an element by the passivation film 3.

[0008] The polyimide film formation process between layers shown in drawing 6 (b) is a subsequent process, and it forms the polyimide film 4 between layers on an element in order to ease the stress to the element from rewiring and a solder bump.

[0009] The rewiring metal deposit process (I) shown in drawing 6 (c) deposits Ti16 and copper 7 by the sputtering technique as a rewiring metal on a wafer.

[0010] The rewiring metal deposit process (II) shown in drawing 6 (d) deposits nickel-V8 and copper 17 by the sputtering technique as a rewiring metal further on the copper 7 deposited by drawing 6 (c). As for the rewiring metal deposit process indicated to be drawing 6 (c) by (d), a deposit metal is only different. In a single-wafer-processing sputtering system with this general, they are a maximum of three kinds of depositable metals. Since

there is a deposit metal in this process by four kinds, it is necessary to divide it into two processes, and it needs to deposit a rewiring metal.

[0011] The bonding pad formation process shown in drawing 6 (e) forms the copper pad 15 in the portion corresponding to the subsequent new bonding pad side, in order that copper may secure wettability with that start migration within a polyimide and reliability makes the contact surface with a polyimide the 6th page of nickel-V for a low reason, and a solder bump.

[0012] The rewiring formation process shown in drawing 6 (f) forms the rewiring pattern 10 by *****ing nickel-V, copper, and Ti, respectively.

[0013] The last polyimide formation process shown in drawing 6 (g) protects rewiring by the last polyimide film 11, and carries out opening of the new bonding pad 12 to the copper pad 15 section.

[0014] Print processes, a method with a ball, etc. are used for the bump formation process shown in drawing 6 (h), and it forms the solder bump 13 on the new bonding pad 12.

[0015]

[Problem(s) to be Solved by the Invention]
However, there are the following troubles in the rewiring structure mentioned above. In a rewiring process, equipment cost is high and the low process of a throughput is a spatter process which deposits a rewiring metal. In order that the usual sputtering system may raise the adhesion force with furring, the kind of eye a required hatchet and deposit metal has [a sputtering etch process] a maximum of three kinds and 3 common process first. At the conventional process, since a rewiring metal is four kind and 4 process, in a required rewiring metal, all cannot deposit but 2 times of spatter processes are needed with 1 time of a spatter process. Therefore, equipment cost was high, and needed to let the low process of a throughput pass twice, the throughput of a rewiring process was reduced, and

there were problems, such as becoming a cost rise.

[0016] this invention is made in view of the above-mentioned conventional technical problem, and in rewiring performed on a chip so that IC for wire bonding carried in a small pocket device etc. can be used by flip chip mounting excellent in reliability and productivity, the purpose is cheap and offers reliable rewiring structure.

[0017]

[Means for Solving the Problem] the new bonding pad from which rewiring structure [in / this invention / in order to attain the above-mentioned purpose] is different in a position in the original pad on a semiconductor chip -- rewiring -- carrying out -- the protective coat of this rewiring -- a polyimide system resin -- using -- the above -- being / in the structure of attaching a salient electrode to new bonding putt, the number of rewiring structures is three, and / the metal structure under a salient electrode / two-layer / **** -- it is characterized by things

[0018] Moreover, the metal of the lowest layer of the aforementioned rewiring is characterized by the aforementioned original pad material and the adhesion force being good, and the aforementioned salient electrode material and wettability being good.

[0019] Moreover, the metal of the lowest layer of the aforementioned rewiring is characterized by being a metal containing nickel or nickel.

[0020] Moreover, the metal of the interlayer of the aforementioned rewiring is characterized by the metal and adhesion force of the lowest layer of the aforementioned rewiring being good, and the aforementioned salient electrode material and wettability being good.

[0021] Moreover, the metal of the interlayer of the aforementioned rewiring is characterized by being copper.

[0022] Moreover, the metal of the best layer

of the aforementioned rewiring is characterized by the aforementioned rewiring's metal and adhesion force of an interlayer being good, and the aforementioned polyimide system resin and the adhesion force being good.

[0023] Moreover, the metal of the best layer of the aforementioned rewiring is characterized by being a metal containing titanium, a titanium nitride, chromium, nickel, or nickel.

[0024] Moreover, the aforementioned salient electrode is characterized by being solder.

[0025]

[Embodiments of the Invention] Based on a drawing, the rewiring structure in this invention is explained below. Drawing 1 is the operation gestalt of this invention, and is explanatory drawing showing the process of rewiring. Drawing 2 is explanatory drawing showing the cross section of rewiring which is the operation gestalt of this invention. Drawing 3 is the plan showing the concept of rewiring which is the operation gestalt of this invention. In addition, the same sign shows the same member as the conventional technology, and it omits the explanation.

[0026] Drawing 1 shows the rewiring process in this invention. Since it is the same as the conventional technology, drawing 1 (a) and drawing 1 (b) omit explanation.

[0027] The rewiring metal deposit process shown in drawing 1 (c) deposits nickel-V6, copper 7, and nickel-V8 at three processes in order by the sputtering technique in the rewiring metal 5. Since rewiring metals are two kinds and three processes, they can deposit a rewiring metal by one spatter.

[0028] That is, with the gestalt of this operation, as a metal of the lowest layer of rewiring, an original pad (usually aluminum) and adhesion are good, the solder and wettability which are a salient electrode use the good alloy of nickel-V, as a metal of the interlayer of rewiring, nickel-V

and the adhesion force of the lowest layer are good, and wettability with the solder which is a salient electrode uses good copper similarly. Furthermore, as a metal of the best layer of rewiring, the adhesion force with the copper which is an interlayer's metal is good, and the polyimide system resin and adhesion force which are an insulator layer use the alloy of good nickel-V.

[0029] Even if the rewiring metal of a new bonding pad portion reacts with polyimide resin or makes an oxide film, it *****s nickel-V8 of the best layer of a rewiring metal using the Meltex engine failure lip NP so that it can remove easily, and the nickel-V opening process shown in drawing 1 (d) exposes copper 7 to the nickel-V opening 9, when protecting a rewiring metal by polyimide resin.

[0030] The rewiring formation process shown in drawing 1 (e) *****s nickel-V8 of the rewiring metal 5 using the Meltex engine failure lip NP, *****s copper 7 using the Meltex engine failure lip C, *****s nickel-V6 using the Meltex engine failure lip NP, and forms the rewiring pattern 10.

[0031] The last polyimide film formation process shown in drawing 1 (f) protects the rewiring pattern 10, and it forms the new bonding pad 12 using the last polyimide film 11 so that the nickel-V opening 9 may be exposed.

[0032] Print processes, a method with a ball, etc. are used for the bump formation process shown in drawing 1 (g), and it forms the solder bump 13 who is a salient electrode on the new bonding pad 12.

[0033] Drawing 2 shows the A-A' cross section of drawing 3. The polyimide film 4 between layers is used for a layer insulation film, and as a metal of the rewiring pattern 10, in order to make nickel-V6 and wiring resistance low at barrier metal with an original pad and to raise the adhesion force with copper 7 and a polyimide film, nickel-V8 is used and it

constitutes from a metal of three layers. Moreover, the nickel-V opening 9 is formed in the new bonding pad 12 section formed by the last polyimide film 11 as the last insulator layer, copper 7 is exposed, and the solder bump's 13 wettability is raised because the solder bump 13 does a direct file to copper 7. Therefore, the metal layer under the solder bump 13 who is a salient electrode consists of two-layer. In this case, although the solder bump 13 and copper 7 are mixed with heat reliability and solder arrives at nickel-V6 front face, since nickel-V6 has solder and good wettability, it does not cause poor adhesion.

[0034] Moreover, in the form of this operation, since the metal (nickel-V) of the lowest layer under the solder bump 13 who is a salient electrode is the same as the rewiring metal of the lowest layer of rewiring and the metal (copper) of the best layer under the solder bump 13 who is a salient electrode similarly is the same as the rewiring metal of the interlayer of rewiring, each metal can be deposited at the same spatter process.

[0035] In addition, with the form of this operation, although copper was shown as the metal of the lowest layer of rewiring, and a metal of an interlayer with the sufficient aforementioned salient electrode material and sufficient wettability with the sufficient adhesion force, in addition to this, you may use Au and Pd. Moreover, with the form of this operation, although the nickel-V alloy was shown as a metal of the best layer of rewiring, in addition to this, you may use either of the metals containing titanium, a titanium nitride, chromium, nickel, or nickel.

[0036]

[Effect of the Invention] As explained above, according to the structure of rewiring of this invention, the insulator layer of a polyimide system resin is used, since the number of rewiring metals is three, a rewiring metal deposit process can be ended at one process, and since the

structure under a salient electrode is two-layer, adhesion with a salient electrode can be secured easily, there is reliability, and the rewiring structure of a low cost can be offered.

[0037] Moreover, an original pad and adhesion have the good metal of the lowest layer of rewiring, and a salient electrode material and wettability can secure reliability easily by the good thing.

[0038] Moreover, it can be made to deposit by the sputtering technique easily according to the metal of the lowest layer of rewiring being a metal containing nickel or nickel.

[0039] Moreover, the metal and adhesion force of the lowest layer have the good metal of the interlayer of rewiring, and wettability with a salient electrode can secure reliability easily by the good thing.

[0040] Moreover, the metal of the interlayer of rewiring can deposit by the sputtering technique easily, and can improve the electrical property of rewiring because it is copper.

[0041] Moreover, reliability is easily securable because an interlayer's metal and adhesion force have the good metal of the best layer of rewiring and a polyimide system resin and the adhesion force are good.

[0042] Moreover, it can be made to deposit by the sputtering technique easily according to the metal of the best layer of rewiring being any one of the metals containing titanium, a titanium nitride, chromium, nickel, and nickel.

[0043] Moreover, a salient electrode can form a cheap salient electrode because it is solder.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is explanatory drawing showing the manufacturing process of

rewiring concerning the gestalt of operation of this invention.

[Drawing 2] It is explanatory drawing showing the cross section of rewiring concerning the gestalt of operation of this invention.

[Drawing 3] It is explanatory drawing showing the conceptual diagram of rewiring.

[Drawing 4] It is explanatory drawing showing the cross section of the conventional rewiring.

[Drawing 5] It is explanatory drawing showing the cross section of the conventional rewiring.

[Drawing 6] It is explanatory drawing showing the manufacturing process of the conventional rewiring.

[Description of Notations]

- 1 Wafer
- 2 Original Pad
- 3 Passivation Film
- 4 Polyimide Film between Layers
- 5 Relocation Wiring Metal
- 6 Nickel-V
- 7 Copper
- 8 Nickel-V
- 9 Nickel-V Opening
- 10 Rewiring Pattern
- 11 The Last Polyimide Film
- 12 New Bonding Pad
- 13 Solder Bump
- 14 IC Chip
- 15 Copper Pad
- 16 Ti

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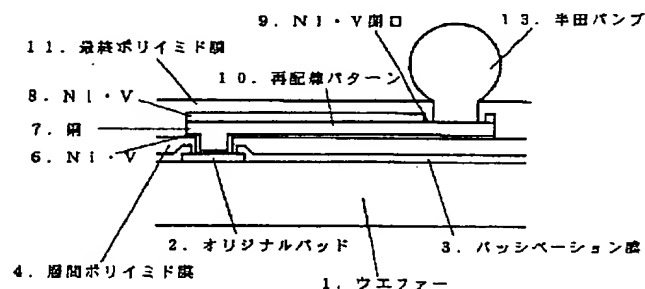
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(54) 【発明の名称】 半導体配線の構造

(57) 【要約】

【課題】 ポリイミドを絶縁膜とし、再配線したバンプ構造で、無電解型の半田バンプを作るとき、スパッターが2工程になってしまい、安価な再配置バンプが作れなかった。

【解決手段】 バリアメタルにNi/V、中間層に銅、最上層にNi/Vの構造にし、再配線形成時に最上層のNi/Vのパッド面をエッチングする構造にすることで、スパッターを1工程で無電解型半田バンプを形成できる。



【従来の技術】近年、半導体パッケージの小型化、高密度化に伴いベア・チップを直接フェイスダウンで、基板上に実装するフリップチップボンディングが開発されている。カメラ一体型VTRや携帯電話機等の登場により、ベア・チップと略同じ寸法の小型パッケージ、所謂CSP（チップサイズ/スケール・パッケージ）を載せた携帯機器が相次いで登場してきている。最近CSPの開発は急速に進み、その市場要求が本格化している。しかし、フリップチップボンディングピッチはワイヤーボンディングピッチに比べボンディングピッチが大きいため、ワイヤーボンディング用ICはそのままフリップチップに使うことはできない。そのため、先ず、半導体チップの周辺にあるワイヤーボンディング用パッドを半導

【0010】図6（d）に示す再配線金属析出工程（I）は、図6（c）で析出させた銅7上にさらに再配線

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金属としてNi・V8と銅17をスパッター法で析出させる。図6(c)と(d)で示す再配線金属析出工程は析出金属が違っただけである。これは、一般の枚葉式スパッター装置では析出できる金属は最大3種類までである。この工程における析出金属は4種類で有るため、2工程に分け再配線金属を析出させる必要がある。

【0011】図6(e)に示すボンディングパッド形成工程は、銅はポリイミド内でマイグレーションを起こし信頼性が低いため、ポリイミドとの接触面をNi・V6面にすること、及び半田バンプとの濡れ性を確保するため、その後の新ボンディングパッド面に対応した部分に銅パッド15を形成する。

【0012】図6(f)に示す再配線形成工程は、Ni・V、銅、Tiをそれぞれエッチングすることで再配線パターン10を形成する。

【0013】図6(g)に示す最終ポリイミド形成工程は、再配線を最終ポリイミド膜11で保護し、銅パッド15部に新ボンディングパッド12を開口する。

【0014】図6(h)に示すバンプ形成工程は、印刷法、ボール付法等を使い、新ボンディングパッド12上に半田バンプ13を形成する。

【0015】

【発明が解決しようとする課題】しかしながら、前述した再配線構造には次のような問題点がある。再配線工程において、装置コストが高く、スループットの低い工程は、再配線金属を析出させるスパッター工程である。通常のスパッター装置は下地材料との密着力を上げるために、最初にスパッターエッチ工程が必要なため、析出金属の種類は最大3種類・3工程が一般的である。従来の工程では、再配線金属が4種類・4工程であるため、1回のスパッター工程では、必要な再配線金属を全部は析出できず、2回のスパッター工程が必要になる。そのため、装置コストが高く、スループットの低い工程を2度通す必要があり、再配線工程の処理能力を低下させ、コストアップになる等の問題があった。

【0016】本発明は、上記従来の課題に鑑みなされたものであり、その目的は小型携帯機器等に搭載するワイヤーボンディング用ICを信頼性及び生産性に優れたフリップチップ実装で使えるようにチップ上で行う再配線において、安価で信頼性のある再配線構造を提供するものである。

【0017】

【課題を解決するための手段】上記目的を達成するために、本発明における再配線構造は、半導体チップ上のオリジナルパッドを位置の違う新しいボンディングパッドに再配線し、該再配線の保護膜にポリイミド系樹脂を使い、前記新しいボンディングパッドに突起電極をつける構造において、再配線構造が3層であり、突起電極の下の金属構造が2層であることあることを特徴とするものである。

(3)

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【0018】また、前記再配線の最下層の金属は、前記オリジナルパッド材料と密着力が良く、かつ前記突起電極材料と濡れ性が良いことを特徴とするものである。

【0019】また、前記再配線の最下層の金属は、ニッケル又はニッケルを含む金属であることを特徴とするものである。

【0020】また、前記再配線の間層の金属は、前記再配線の最下層の金属と密着力が良く、かつ前記突起電極材料と濡れ性が良いことを特徴とするものである。

10 【0021】また、前記再配線の間層の金属は、銅であることを特徴とするものである。

【0022】また、前記再配線の最上層の金属は、前記再配線の間層の金属と密着力が良く、かつ前記ポリイミド系樹脂と密着力が良いことを特徴とするものである。

【0023】また、前記再配線の最上層の金属は、チタン、窒化チタン、クロム、ニッケル又はニッケルを含む金属であることを特徴とするものである。

20 【0024】また、前記突起電極は、半田であることを特徴とするものである。

【0025】

【発明の実施の形態】以下図面に基づいて本発明における再配線構造について説明する。図1は本発明の実施形態で、再配線の工程を示す説明図である。図2は本発明の実施形態である再配線の断面図を示す説明図である。図3は本発明の実施形態である再配線概念を示す平面図である。なお、従来技術と同一部材は同一符号で示し、その説明を省略する。

30 【0026】図1は本発明における再配線工程を示す。図1(a)及び図1(b)は、従来技術と同じであるため、説明は省略する。

【0027】図1(c)に示す再配線金属析出工程は、再配線金属5をスパッター法によりNi・V6、銅7、Ni・V8を順番に3工程で析出する。再配線金属は2種類、3工程であるため、1回のスパッターにより再配線金属を析出させることができる。

40 【0028】つまり本実施の形態では再配線の最下層の金属として、オリジナルパッド(通常はアルミニウム)と密着性が良く、突起電極である半田と濡れ性がよい、Ni・Vの合金を用いており、同様に再配線の間層の金属としては、最下層のNi・Vと密着力が良く、突起電極である半田との濡れ性がよい銅を用いている。更に再配線の最上層の金属としては、中間層の金属である銅との密着力が良く、絶縁膜であるポリイミド系樹脂と密着力がよいNi・Vの合金を用いている。

50 【0029】図1(d)に示すNi・V開口工程は、再配線金属をポリイミド樹脂で保護するとき、新ボンディングパッド部分の再配線金属が、ポリイミド樹脂と反応したり、酸化膜を作っても容易に除去できるように再配線金属の最上層のNi・V8をメルテックス(株)製エ

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ンストリップNPを使いエッチングし、Ni・V開口9に銅7を露出させる。

【0030】図1(e)に示す再配線形成工程は、再配線金属5のNi・V8をメルテックス(株)製エンストリップNPを使いエッチングし、銅7をメルテックス(株)製エンストリップCを使いエッチングし、Ni・V6をメルテックス(株)製エンストリップNPを使いエッチングし、再配線パターン10を形成する。

【0031】図1(f)に示す最終ポリイミド膜形成工程は、再配線パターン10を保護し、Ni・V開口9を露出するように、最終ポリイミド膜11を使って、新ボンディングパッド12を形成する。

【0032】図1(g)に示すバンプ形成工程は、印刷法、ボール付法等を使い、新ボンディングパッド12上に突起電極である半田バンプ13を形成する。

【0033】図2は図3のA-A'断面図を示す。層間絶縁膜に層間ポリイミド膜4を使い、再配線パターン10の金属としては、オリジナルパッドとのバリアーメタルにNi・V6、配線抵抗を低くするため銅7、ポリイミド膜との密着力を上げるため、Ni・V8を使い、3層の金属で構成している。また、最終絶縁膜として最終ポリイミド膜11で形成した新ボンディングパッド12部にNi・V開口9を設け、銅7を露出させ、銅7と半田バンプ13が直接接続することで半田バンプ13の濡れ性を上げている。従って突起電極である半田バンプ13の下層の金属層は2層で構成されている。この場合、半田バンプ13と銅7は熱信頼性で混合し、半田はNi・V6表面に到達するが、Ni・V6は半田と濡れ性が良いため、密着不良を起こすことはない。

【0034】また本実施の形態では、突起電極である半田バンプ13の下層の最下層の金属(Ni・V)が、再配線の最下層の再配線金属と同じであり、同様に突起電極である半田バンプ13の下層の最上層の金属(銅)が、再配線の中間層の再配線金属と同じなので、同一のスパッター工程でそれぞれの金属を析出させることができる。

【0035】なお、本実施の形態では、再配線の最下層の金属と密着力が良く、かつ前記突起電極材料と濡れ性が良い中間層の金属として銅を示したが、これ以外にはAu、Pdを用いても良い。また、本実施の形態では、再配線の最上層の金属としてNi・V合金を示したが、これ以外にはチタン、窒化チタン、クロム、ニッケル又はニッケルを含む金属のいずれかを用いてもよい。

【0036】

【発明の効果】以上説明したように、本発明の再配線の構造によれば、ポリイミド系樹脂の絶縁膜を使い、再配線金属が3層であるため、再配線金属析出工程を1工程で終了でき、また突起電極下の構造が2層であるため、容易に突起電極との密着を確保することができ、信頼性が有り、低コストの再配線構造を提供することができ

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る。

【0037】また、再配線の最下層の金属がオリジナルパッドと密着性が良く、突起電極材料と濡れ性がよいことで容易に信頼性を確保することができる。

【0038】また、再配線の最下層の金属が、ニッケル又はニッケルを含む金属であることで、容易にスパッター法で析出させることができる。

【0039】また、再配線の中間層の金属が、最下層の金属と密着力が良く、突起電極との濡れ性がよいことで、容易に信頼性を確保できる。

【0040】また、再配線の中間層の金属が、銅であることで、容易にスパッター法で析出でき、再配線の電気特性を向上することができる。

【0041】また、再配線の最上層の金属が、中間層の金属と密着力が良く、ポリイミド系樹脂と密着力がよいことで、容易に信頼性を確保することができる。

【0042】また、再配線の最上層の金属が、チタン、窒化チタン、クロム、ニッケル、ニッケルを含む金属のいずれか1つであることで、容易にスパッター法で析出させることができる。

【0043】また、突起電極が、半田であることで、安価な突起電極を形成できる。

【図面の簡単な説明】

【図1】本発明の実施の形態に係わる再配線の製造工程を示す説明図である。

【図2】本発明の実施の形態に係わる再配線の断面図を示す説明図である。

【図3】再配線の概念図を示す説明図である。

【図4】従来の再配線の断面図を示す説明図である。

【図5】従来の再配線の断面図を示す説明図である。

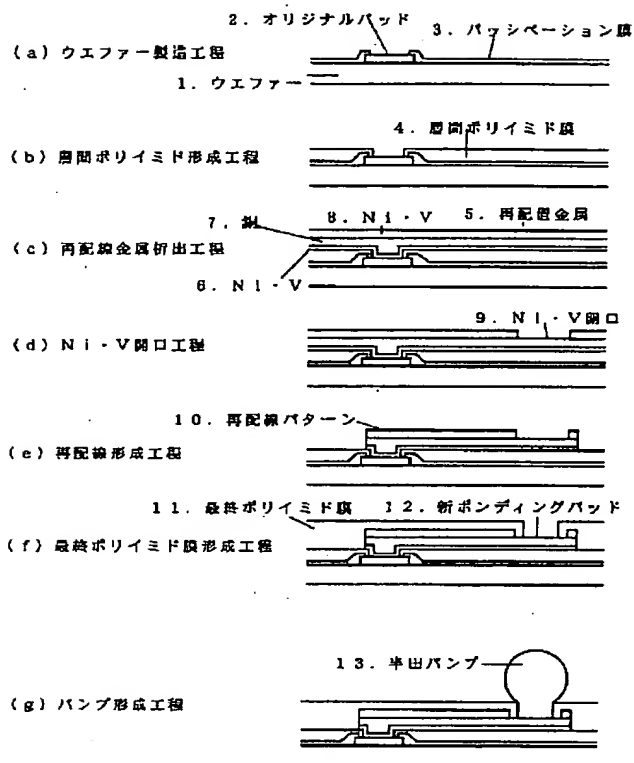
【図6】従来の再配線の製造工程を示す説明図である。

【符号の説明】

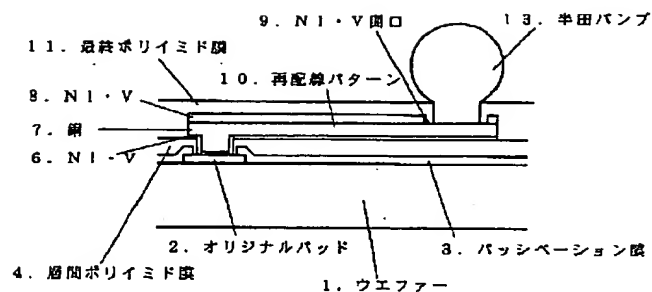
- 1 ウエファア
- 2 オリジナルパッド
- 3 パッシベーション膜
- 4 層間ポリイミド膜
- 5 再配置配線金属
- 6 Ni・V
- 7 銅
- 8 Ni・V
- 9 Ni・V開口
- 10 再配線パターン
- 11 最終ポリイミド膜
- 12 新ボンディングパッド
- 13 半田バンプ
- 14 ICチップ
- 15 銅パッド
- 16 Ti

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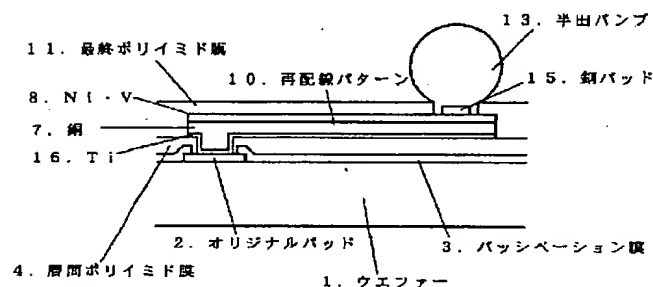
【図1】



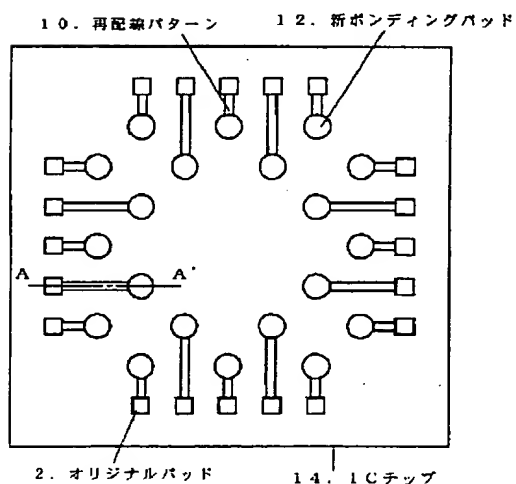
【図2】



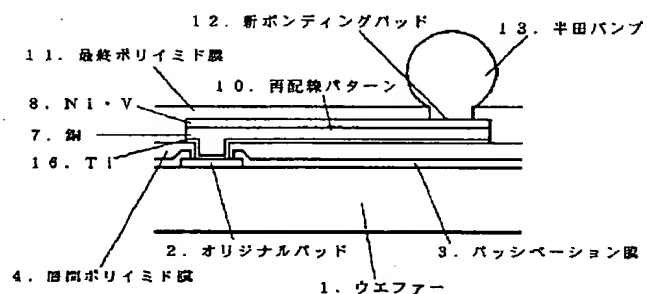
【図5】



【図3】



【図4】



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【図6】

